L3(3.3)-Quadratic Relations in Factored Form

Key Concepts:

- factored form of quadratic relation
- direction of opening from 'a'
- solving for zeroes

- using symmetry to find:
- x-coordinate of vertex
- axis of symmetry

- using substitution to find:
- y-coordinate of vertex
- y-intercept

Apr 10-6:32 PM

Is $y = 2(x+1)(x-5)$ a quadratic relation?

Examine 1st and 2nd differences:

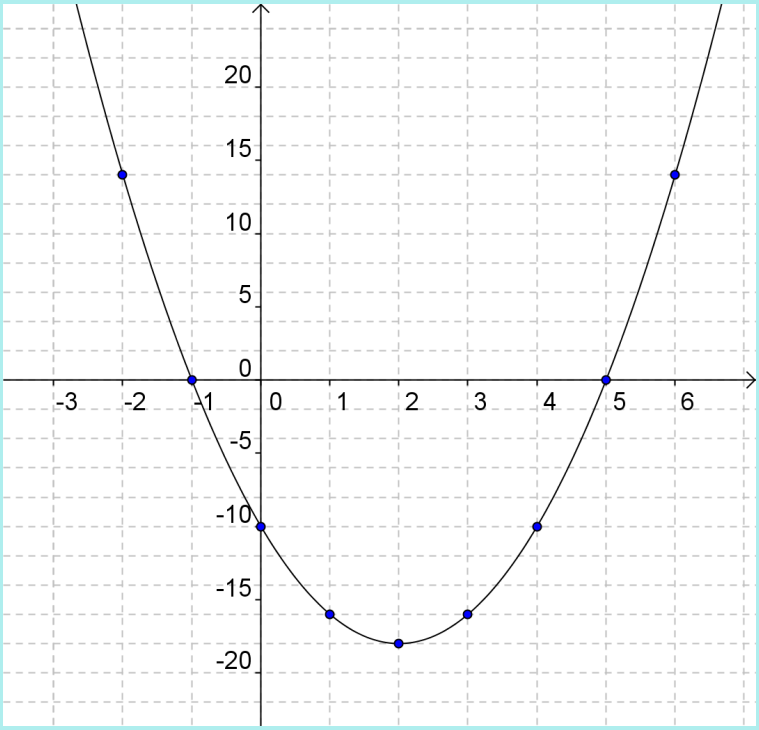
x	y
-2	14
-1	0
0	-10
1	-16
2	-18

Oct 19-8:29 PM

Is $y = 2(x+1)(x-5)$ a quadratic relation?

Graph the relation:

x	y
-2	14
-1	0
0	-10
1	-16
2	-18
3	-16
4	-10
5	0
6	14



Oct 19-8:29 PM

Quadratic Relations in Factored Form

The equation of a quadratic relation may be written in several forms:

1. standard form: $y = ax^2 + bx + c$
2. factored form: $y = a(x - s)(x - t)$
3. vertex form: $y = a(x - h)^2 + k$

The factored form, $y = a(x - s)(x - t)$, is most useful for finding the zeroes, which are $x = s$ and $x = t$.

Mar 20 - 4:17 PM

Consider the following...

Give two numbers that have a product of zero:

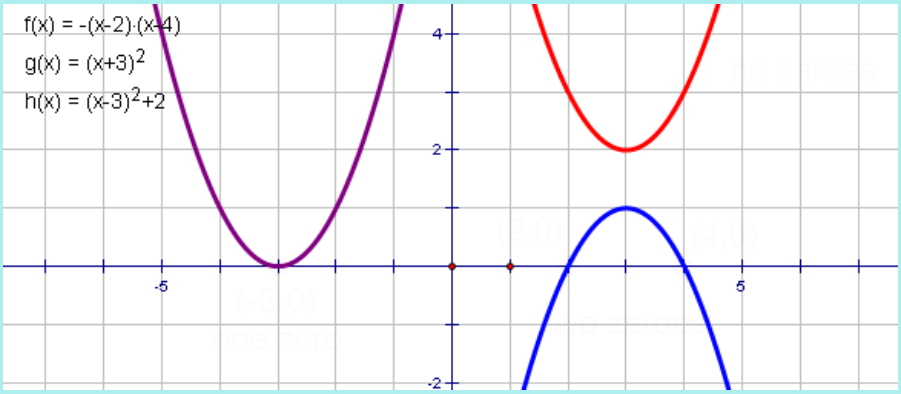
What do you notice? $(\text{any value}) \times 0 = 0$

Solve:

(a) $3x = 0$ (b) $57y = 0$ (c) $3xy = 0$

Mar 31-8:45 AM

Depending upon the location of the vertex, and whether the parabola opens up or down, it may have 0, 1, or 2 distinct (unique) zeroes.



Zeroes occur where the y-coordinate of the parabola is equal to zero.

Apr 17-11:18 PM

To find the zeroes algebraically, we **set y = 0** and solve for the x-values that make the equation true.

Ex.1 Determine the zero(es) of each

(a) $y = x(x - 10)$

Recall:

Zero multiplied by anything is zero.

If (a)(b) = 0 then
a = 0 or b = 0 (or both are zero).

(b) $y = -2(x - 5)(3x - 1)$ (c) $y = 2(x - 2)^2$

Apr 17-11:30 PM

The zeroes and symmetry can be used to find the vertex (h, k).

For the x-coordinate (h), find the midpoint of the zeroes:

$$MP = \frac{x_1 + x_2}{2} = \frac{s + t}{2}$$

For the y-coordinate (k), substitute the midpoint into the equation and solve for y.

$y = a(x - s)(x - t)$

$y = a(MP - s)(MP - t)$

Apr 17-11:45 PM

Ex.2 Determine the vertex:

(a) $y = -2(x - 2)(x - 8)$ predict zeroes:

Apr 18-12:03 AM

Ex.3 A parabola has zeroes at -3 and 2, and a y-intercept of 18. Determine the equation.

Oct 19-9:26 PM

Assigned Work:

p. 155-157 # 2, 3, 4ace, 5, 6ace, 7, 10

Oct 14-8:13 AM